REMARKS

In view of the above amendments and following remarks reconsideration and reexamination are requested.

It is initially noted that the specification has been amended to delete the recitation of "an aqueous solution of nitric acid" as one of the oxidizing agents on page 95 of the substitute specification.

In the Office Action of March 3, 2008, the Examiner rejected claim 112 as being unpatentable over US 6267853 (Dordi 1) in view of US 6231428 (Maloney), US 6309981 (Mayer), US 6176992 (Talieh) and US 2002/0157960 (Dordi 2). Further, claim 113 was rejected by the Examiner as being unpatentable over Talieh and Dordi 2. However, it is respectfully submitted that the present invention clearly distinguishes over all of these references, whether considered separately or in combination. These claims have been amended above to further define over these references.

In particular, claim 112 has been amended to recited the bevel etching unit as having both a substrate holding portion for holding and rotating the substrate, a center nozzle configured to supply an acid solution to a center portion of the semiconductor substrate and an edge nozzle configured to supply an oxidizing agent solution to a peripheral edge portion of the substrate. Further, the bevel etching unit is recited as operable to rotate the substrate and supply the acid solution to the center nozzle and the oxidizing agent solution to the edge nozzle simultaneously so as to mix the acid solution and the oxidizing agent solution with each other on the peripheral edge portion of the semiconductor substrate in rotation.

A copper film or the like that is formed on the upper surface and end surface on the peripheral edge of the substrate is rapidly oxidized with the oxidizing agent solution, and is simultaneously etched with the acid solution that is supplied from the center nozzle and spread on the entire face of the substrate, whereby it is dissolved and removed. By mixing the acid

solution and the oxidizing agent solution at the peripheral edge portion of the substrate, a steep etching profile can be obtained, as opposed to the use of a mixture of them produced in advance of being supplied.

Dordi 1 cited by the Examiner discloses a single nozzle for supplying an etchant. By contrast, the present invention includes two nozzles that are configured to supply the acid solution and the oxidizing solution, which are not etchant until they are mixed with each other. Thus, Dordi 1 does not disclose the structure, function or advantages of the invention as set forth in claim 112.

Rather, in Dordi 1 three nozzles 2150 are disposed at the edge of the substrate to supply etchant, which etchant is restricted to an outer 3mm annular portion of the wafer so as to achieve 3 mm edge exclusion. See Fig. 15, for example.

The Examiner acknowledges that Dordi 1 fails to teach a nozzle capable of supplying an acid solution or a central fluid discharge member connected to a source of acid such that acid is supplied from the acid source to the central fluid discharge member and then to the central portion of the wafer. However, the Examiner cites Mayer as teaching a nozzle capable of supplying an acid to a central fluid discharge member for the purpose of performing an acid rinse. Mayer does indeed have an acid wash nozzle 250.

In Mayer, etchant is delivered to a nozzle 256 at the edge of the substrate, much as in Dordi 1; as noted in column 8, the etchant is delivered to the edge bevel region of a wafer 224 to remove PVD copper in that region. What is delivered by nozzle 250 is an acid rinse to remove residual copper oxide that remains after etching the wafer and aids in overall cleaning. However, even if added to Dordi 1, it does not result in the present invention.

The present invention requires that the center nozzle supply an acid solution to a center portion of the substrate and an edge nozzle to supply an oxidizing agent solution to a peripheral edge portion of the substrate at the same time so as to mix. Etchant does not result until the

mixing, contrary to the references cited by the Examiner. Thus even if combined in the manner proposed by the Examiner, the limitations of claim 112 do not result.

Claim 113 has been amended to emphasize that the substrate holding portion holds and rotates the substrate and is movable between a first position and a second position. At the first position, a cathode electrode is in contact with the substrate, a seal member is positioned inwardly of the cathode electrode and plating liquid is supplied to the substrate. A pure water supply member supplies pure water onto the substrate when held in the second position.

The Examiner cited Talieh as meeting the majority of the limitations of claim 113. However, The Examiner initially cites a substrate holding portion 25 in Fig. 1. But as identified by Talieh, element number 25 is a resting pad on which the substrate rests. It cannot rotate the substrate or move it between a first position and a second position.

The Examiner further cites anode 30. However, claim 113 requires the anode to be above the surface to be plated when held by the substrate holding portion. In Talieh, anode plate 30 is below the substrate.

The Examiner further considers elements 34 and 44 to supply plating liquid and pure water. However, in Talieh, channel 44 is an alternative to channel 34, both of which are used to dispense electrolyte. As noted in column 4, inlet 44 can also be used to apply deionized water, but this is for polishing. In any case, there is not disclosed both a plating liquid supply member and a pure water supply member as part of the same apparatus; rather, Talieh discloses that the one channel can be used for two different operations.

Further, claim 113 now requires that the pure water supply member is operable to supply the pure water onto the substrate when held and rotated by the substrate holding portion at the second position to clean the cathode electrode and the seal member with the pure water from the substrate.

While the Examiner takes the position that Dordi 2 teaches a movable substrate holding

member that can raise and lower a substrate, a combination that would result in the above required structure is not obvious from the two references. Dordi 2 provides a distinctly different structural arrangement for its plating device. There is no reason to apply the holding member of Dordi 2 to Talieh; the Examiner's cited reasons of corresponding to respective operating conditions as taught by Dordi 2 begs the question of what conditions of Dordi would be desired in Talieh, especially as the combination would require the significant restructuring of Talieh – note container 20 and the first axis 14 around which the mechanical pad 32 rotates in Talieh.

What becomes even clearer is that there is no teaching to apply a substrate holding portion that can hold and rotate the substrate and move it between a first position and a second position to Talieh, wherein that second position is one in which the pure water supply member is operable to supply pure water to the substrate to clean the cathode electrode and the seal member. For this reason, as well as the other deficiencies of Dordi 2 and Talieh as discussed above, it is submitted that claim 113 clearly distinguishes over these prior art references.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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